Automatic artificial intelligence based defect detection on turbine blades

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Abstract

The quality control of turbine parts is a critical point for safety reasons. It is important directly in production and engine MRO (maintenance, repair, and overhaul) as well because defects can lead to failures of the parts, which have a great impact on the overall system performance and safety as minor defects can lead to catastrophic outcomes. On turbine parts, key measurement applications include sharp edges, local curvature, cooling holes and blade defects as well. Current methods for measuring such defects are often time-consuming manual checks using replica techniques, profile projectors and tactile methods.

In this work, a new automated measurement solution based on artificial intelligence and focus variation is presented which removes the user influence to receive objective and traceable results for repeatable decisions and precise documentation. The measurement process consists of a fast 2D detection by using a smart sensor for fast scanning of complex geometries, an integrated real time artificial intelligence analysis and a high-resolution optical 3D focus variation sensor. The optical inspection also includes the measurement and evaluation of geometrical parameters such as width, length, depth, or volume of the defects. The measurement solution, which is currently in development, as well as a first insight in its use for repeatable, traceable, automatic, and fast defect detection is presented.

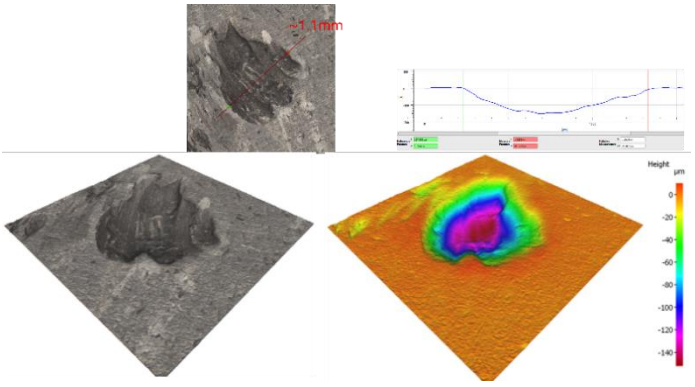

Figure 1: Example of a defect measurement on a turbine blade.